We claim:

1. A hydroformylation process in which at least one olefin having from 2 to 6 carbon atoms is reacted continuously with carbon monoxide and hydrogen in the presence of a hydroformylation catalyst in a reaction zone in which a liquid phase is present and a stream S) is taken from the liquid phase, heat is removed from this stream and the stream is subsequently returned to the reaction zone without removal of a material component, wherein the reaction proceeds in the stream S) at least until the removal of the heat and carbon monoxide and/or hydrogen are/is fed into the stream before it is depleted in these/this component(s) to such an extent that the remaining components undergo undesirable secondary reactions and/or the hydroformylation essentially stops.

2. A process as claimed in claim 1, wherein the heat is withdrawn from the stream S) by bringing it into contact with a heat exchanger.

3. A process as claimed in either of the preceding claims, wherein the heat withdrawn from the stream S) is used in a heat-consuming step of the hydroformylation process or of another process.

4. A process as claimed in any of the preceding claims, wherein the heat is withdrawn from the stream S) without use of an auxiliary medium for heat transfer.

5. A process as claimed in any of the preceding claims, wherein

   i) an olefin-containing feed stream comprising at least one olefin having from 2 to 6 carbon atoms and also carbon monoxide and hydrogen are fed into a reaction zone and reacted in the presence of a hydroformylation catalyst, where a liquid phase is present in the reaction zone and a stream S) is taken from this liquid phase, heat is withdrawn from the stream and the stream is subsequently returned to the reaction zone without removal of a material component,

   ii) an output is taken from the reaction zone and is subjected to a single-stage or multistage separation operation to give at least one stream comprising the

major part of the hydroformylation product and a stream comprising the major part of the unreacted olefin, and

iii) at least part of the stream comprising the major part of the unreacted olefin is returned to the reaction zone.

6. A process as claimed in claim 5, wherein the stream comprising the major part of the unreacted olefin is obtained by firstly separating off a crude hydroformylation product from the output from the reaction zone and subjecting it to a degassing step, with the heat withdrawn from the stream S) being used to cover at least part of the heat requirement of the degassing step.

7. A process as claimed in claim 5 or 6, wherein the stream comprising the major part of the unreacted olefin further comprises saturated hydrocarbons and is separated by distillation into an olefin-enriched fraction and an olefin-depleted fraction, with the heat withdrawn from the stream S) being used to cover at least part of the heat requirement of the distillation.

8. A process as claimed in any of the preceding claims, wherein carbon monoxide is fed into the stream S) before it is depleted in this to such an extent that the olefin reacts with the hydrogen to form hydrogenation products.